Responses to Examiner's Remarks

Double Patenting

Regarding Examiner's remarks on double patenting, Applicant hereby includes a Terminal Disclaimer.

Claim Rejections – 35 USC 102

Re Claim 6 Rejection:

DesLauriers does not disclose a "...diaphragm displacement to electrical conversion means to convert diaphragm displacement due to body sound vibrations to electrical signals..." as claimed in the present invention. DesLauriers utilizes a diaphragm, which vibrates, and a separate microphone that detects sound inside the stethoscope housing cavity. The microphone has its own diaphragm which picks up sound inside the stethoscope housing, but it cannot detect diaphragm displacement for the diaphragm placed against the body, as claimed. Comparing DesLauriers Fig. 5 and Fig. 6 to the present invention, we see that DesLauriers' diaphragm 41 is placed to contact the body, but there is no means to detect diaphragm displacement. Instead, DesLauriers shows a microphone 205 (Fig. 6) placed inside the housing, picking up sound, but not converting diaphragm displacement to an electrical signal. In contrast, in the present invention, Fig. 1, Diaphragm 2 displacement is detected by Plate 3 and Electronic Circuit 10. There is no secondary microphone as in DesLauriers.

Re Claims 14-15 Rejections:

AAPA para 8 makes absolutely no mention whatsoever of "...output channels connected to one or more corresponding electrodes..." or to "...electrodes that can be "removably attached to a live or inanimate body" AAPA para 8 refers to conventional microphone methods, and the subject matter of Claim 14 is not a microphone but the injection of an external signal into a capacitive plate mounted on a body or other object for the purposes of creating a simulation of audio sensing. This is entirely different from a microphone described in AAPA para 8.

Claim 15 extends this method to include a capacitive sensor that can pick up the injected voltages in the capacitive plate that is mounted and connected as described in Claim 14. As stated, this is not related to AAPA para 8, which describes a microphone. Claims 14 and 15 do not claim microphones, but capacitive voltage sensors.

It is very important to differentiate AAPA from Claims 14-16. These claims address subject matter relating to the injection of external stimuli into capacitive sensors, rather than the detection of vibration, which is the operational principle of a microphone, the subject matter of AAPA. The invention claimed in Claims 14-16 relates to simulating

sound production via electromagnetic means rather than mechanical pressure, motion or vibration.

Re Claim 17 Rejection:

The claimed invention relates to inducing signals into electromagnetic stimulus transducers, and then detecting the electromagnetic stimuli and converting them to audio signals. See Fig. 30 if the present invention, in which the electromagnetic transducers 304X produce signals rather than sounds. The transducer 325 then detects those signals and converts them to electrical signals and ultimately to audio signals.

Examiner's citation, Lancon addresses subject matter that is unrelated to the present invention. In Lancon (Fig. 1) loudspeakers produce mechanical acoustic waves that are heard by a listener. There is no relationship between Lancon and the present invention.

Claim Rejections - 35 USC 103

Re Claim 1 Rejection:

Stethoscopes rely on the transmission of an acoustic pressure wave up a tube. In the case of electronic stethoscopes, a microphone may be placed inside a tube or chestpiece in order to detect this pressure wave. In order to transmit this pressure wave, the volume of air behind the diaphragm that makes contact with the bosy must be a sealed cavity. If there is any opening in the cavity, the pressure wave simply dissipates and no sound is transmitted.

The method in the present invention of opening the space behind the diaphragm renders stethoscopes other than that of the present invention essentially inoperable since sound cannot be transmitted from the diaphragm vibration up the tubing or to a microphone. The reason that the present invention works whereas others do not is that in the present invention, diaphragm displacement is being detected directly. As long as the diaphragm vibrates, this is detected and converted to an electrical signal. Sound as such is not being detected, and so pressure is irrelevant to the operation of the invention.

Referring to Fig. 18 of the present invention, note that the diaphragm 2 is in housing 1, with an aperture 150, which can be opened or closed using the mechanism 151. If the aperture is open, no pressure changes can be produced by diaphragm 2, since the internal cavity of housing 1 is at external pressure levels.

Now consider Andrea, cited by Examiner. Referring to Andrea Fig. 2, the cavity behind diaphragm 13 is completely closed by the placement of a microphone 7 blocking the end of the tube 12. In the Examiner reference (Andrea col.3 lines 1-25), Andrea discloses an opening or "noise ports" 3, but these are behind a microphone. They are explicitly not behind the diaphragm.

Claim 1 includes "one or more apertures or openings to provide a low-impedance acoustic path for ambient sound to enter the space within the housing including the space behind diaphragm". Andrea explicitly places an aperture behind a microphone and ensures that the space behind the diaphragm is, in fact, closed. Were it open, as in the claimed invention, no sound pressure would propagate to the microphone in Andrea. Andrea therefore teaches away from Claim 1, as is the case with all stethoscopes that detect sound, rather than diaphragm displacement, as in the present invention.

Re Claim 2 Rejection:

As explained above, any opening in the space behind the diaphragm of stethoscopes in the prior art would render them inoperable. There would therefore be no benefit from opening the space at all, let alone adjusting it. To further clarify, if a stethoscope in the prior art develops any aperture that results in an opening to the external environment, the stethoscope becomes inoperable.

Re Claim 4-5 Rejections:

Claim 4 recites "...a diaphragm separate from the housing such that the diaphragm can make contact with a body and vibrate in response to body sounds and can be attached or adhered to said body"

This is not related to Claim 1, and claims a unique diaphragm that is not even attached to the stethoscope housing. This is unique and not disclosed in any of the cited prior art.

Claim 5, dependent on Claim 4, therefore also recites a diaphragm separate from the housing, a unique aspect of the present invention. AAPA para 8 describes conventional microphones in which the diaphragm is part of the microphone assembly, not separate from it.

Re Claim 12 Rejection:

Claim 12 recites "...an ambient sound transducer producing an ambient sound electrical signal; and a storage or output means that stores or outputs both the ambient sound electrical signal and the diaphragm displacement transducer signals"

This is not related to Claim 1, and claims a unique aspect of the invention wherein a sound output transducer is placed inside a stethoscope housing the produce sound. Applicant knows of no prior art that discloses such an invention, including Examiner prior art references.

Re Claim 3 Rejection:

Pluvinage discloses a moisture barrier for the purposes of preventing moisture from entering a hearing aid, while allowing sound to be transmitted to the hearing aid. As explained above, it is counter-intuitive and inoperable to apply the same method to a stethoscope, since a moisture barrier that would otherwise pass acoustic pressures would also serve to dissipate any buildup of acoustic pressure in the housing behind the diaphragm, rendering the stethoscope unworkable in the prior art.

The present invention differs from the prior art in the direct detection of stethoscope diaphragm displacement, said diaphragm making direct contact with the body. By directly detecting this displacement, pressure is not being measured, is not relevant to the operation of the stethoscope, and hence any aperture, even with a moisture barrier, that allows equalization between external in housing pressure does not affect operation. This is not true for the prior art, which must have a sealed cavity in which sounds can be transmitted as pressure waves.

It would thus be counter-intuitive for anyone skilled in the art to consider applying Pluvinage to a stethoscope. In Pluvinage, it is desirable to transmit external sounds and acoustic pressures into the hearing aid. For the reasons given above, this would be unworkable in a stethoscope, and therefore neither obvious nor suggested.

Re Claim 8, 10-11 Rejection:

Claim 8 recites "...AC signal voltages can be applied to said conductive surface, wherein the AC signals are noise-canceling signals that increase the signal-to-noise ratio of the electrical conversion, where the signal is due to body vibration and the noise is due to ambient sound."

The subject matter of Kosaka, cited by Examiner, discloses subject matter that is unrelated to the present invention, and makes no suggestion of the present invention.

In the present invention, claim 8 addresses the injection of a signal into a capacitive sensor that cancels ambient noise. Kosaka describes the muting of the click or pop produced by throwing a switch from one position to another in an electrical circuit. This cannot be applied to ambient noise cancellation, and has no connection to capacitively coupled transducers. Kosaka therefore cannot be combined with any other prior art to suggest anything claimed in Claim 8 or any other claim in the present invention.

Claim 10 recites "...a drive circuit connected to diaphragm electrically-conductive surface such that AC signal voltages can be applied to said conductive surface, wherein the AC signal is a tracking signal to be used for measurement of diaphragm displacement...". Examiner has not elaborated on the reasons that this claim is rejected in light of Claim 8. However, Applicant cannot find any disclosure in the cited prior art that describes or suggests the use of an AC tracking signal to detect the measurement of diaphragm displacement as in Claim 10.

Claim 11 recites a more elaborate method of using an AC signal injected into the plate of a capacitive transducer, and as with Claim 10, the cited prior art does not seem to suggest anything related to Claim 11.

Re Claim 13 Rejection:

Examiner has not elaborated on the specific aspects of rejection of Claims 1 and 8 on which rejection of Claim 13 is based. Applicant finds no suggestion of claim 13 in the prior art cited for Claims 1 or 8. The exchange of diaphragms disclosed in Claim 13 combined with the displacement to electrical transducer is unique to the current invention.

Re Claim 16 Rejection:

Claim 16 is dependent on Claim 14, discussed in more detail earlier in this communication. As a dependent claim, the specific invention of using a computer or other device as a signal source must be considered in light of the unique aspects of Claim 14 on which Claim 16 depends. As stated earlier, Claim 14 is novel and not suggested by the cited prior art.

Conclusion

Applicant proposes that the prior art does not read in any way on the present invention, which is distinctly novel and unique with respect to the prior art cited. Applicant proposes that a meeting with Examiner to clarify the invention and the prior art differences would be most productive. Applicant therefore requests a meeting with the Examiner, should Examiner, upon review of this response, consider the current claims for rejection.

If the Examiner has any questions, he is invited to contact Applicant's attorney at (818) 710-2788.

Respectfully submitted,

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